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THE NORTH AMERICAN SPECIES OF NEMOBIUS.

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The North American species of the Orthopteran genus *Nemobius* Serville are more numerous than has been supposed, notwithstanding that several species have been more than once described as distinct. Prof. L. Bruner, of Lincoln, Neb., has kindly sent me a considerable series from his collection; Mr. A. P. Morse, of Wellesley, Mass., has placed his collection, mainly from New England, in my hands; the collections of the Museum of Comparative Zoölogy and of Mr. S. Henshaw have been at hand; and these, with a few specimens from the National Museum, added to my own, form the basis of the following table and descriptions. Although Trinidad belongs zoölogically to South America, I have added one species found there. The number of known species is hereby doubled, and doubtless more await discovery.

I should add that "*Nemobius circumcinctus*" Scudd. (Proc. Bost. Soc. Nat. Hist., XII, 143) from Mexico is a *Prothacustes* and identical with the later described *P. mexicana* Sauss.; the species given by Provancher (Faune Ent. Can., II, 24) as "*Nemobius (Anaxipha) septentrionalis* Scudd." was named for him by me as *Anaxipha septentrionalis*, but it is identical with *Anaxipha exigua* (Say); it was formerly (Nat. Canad., VIII, 61) called by him *Nemobius exiguus*, as Say's species; an insect referred to as "*Nemobius marginata*" by Miss Murtfeldt (Ins. Life, V, 155) is probably an accidental error, as no such name has been given; "*Nemobius? pulicarius*" Walk. (Cat. Derm. Salt. Brit. Mus., I, 111), is an *Anaxipha*. This covers all the North American species referred to *Nemobius*, except those given below in the synonymy.

I have followed Saussure in employing the female alone (or almost alone) in constructing the following table, since the males of several of

the species are unknown to me. Only the more important synonymy is given.

Table to determine the N. A. species of Nemobius.

A¹. Ovipositor as long as or barely shorter than the hind femora, generally rigidly straight.

b¹. Tip of ovipositor unarmed; last joint of maxillary palpi very obliquely excised at apex.

c¹. Tegmina short; wings wanting; last joint of maxillary palpi bicolored, the oblique apical excision of lower margin beginning before the middle..... **distingendus.**

c². Tegmina long; wings very long; last joint of maxillary palpi unicolored, the oblique apical excision of lower margin beginning beyond the middle..... **ensifer.**

b². Tip of ovipositor serrate or dentate; last joint of maxillary palpi almost transversely excised at apex.

c¹. Ovipositor distinctly (at least a tenth) longer than hind femora.

d¹. Blackish; dark and light colors of tegmina of ♀ feebly contrasted longitudinally above (Northern)..... **fasciatus.**

d². Grayish; dark and light colors of tegmina of ♀ strongly contrasted longitudinally above as on sides (Southern)..... **canus.**

c². Ovipositor barely as long as, or slightly shorter than, hind femora.

d¹. Teeth of ovipositor blunt, little elevated; wings generally very long..... **socius.**

d². Teeth of ovipositor sharp, well elevated, well separated; wings wanting.

e¹. Tegmina of ♀ nearly or quite twice as long as pronotum; of ♂ strongly rounded apically, feebly margined with pallid at sides of dorsal field only, if at all..... **utahensis.**

e². Tegmina of ♀ scarcely longer than pronotum; of ♂ broadly rounded apically, with the dorsal field distinctly margined with pallid throughout except at base..... **ambitosus.**

A². Ovipositor distinctly shorter than the hind femora, usually a little arcuate.

b¹. Tegmina of ♀ nearly or quite as long as the abdomen; wings generally twice as long as tegmina.

c¹. Ovipositor no longer, or scarcely longer, than head and pronotum together.

d¹. Face without vertical pale stripes; lateral field of ♀ tegmina tapering only on the apical third, subequal before it..... **neomexicanus.**

d². Face with a pair of narrow, vertical, percurrent, pale stripes next the inner margin of the eyes; lateral field of ♀ tegmina regularly tapering almost from the base..... **trinitatis.**

c². Ovipositor distinctly longer than head and pronotum together.

d¹. Tegmina of ♀ apically truncate, a little shorter than the abdomen; wings wanting..... **aterrimus.**

d². Tegmina of ♀ apically rounded, as long as the abdomen; wings generally present and then very long..... **cubensis.**

b². Tegmina of ♀ much shorter than the abdomen; wings wanting.

c¹. Ovipositor barely arcuate.

d¹. Tegmina of ♀ no longer than head and pronotum combined.

mormonius.

d². Tegmina of ♀ distinctly longer than head and pronotum combined.

e¹. Longitudinal markings of head continuous to extreme back of same; ovipositor with distinct and well separated teeth at apex.

toltecus.

e². Longitudinal markings of head interrupted at the crown, the whole back portion immaculate, sharply defined from the portions in front at the summit, which is feebly subcarinate transversely; ovipositor with fine, close, minute denticulations. . . . **mexicanus.**

c². Ovipositor distinctly though but feebly arcuate. . . . **carolinus.**

Nemobius distinguendus, sp. nov.

Head not very full, castaneous black, with a straight, oblique, bright luteous stripe above the eyes, passing from the antennal scrobes to the back of the head on either side; eyes not prominent; antennæ blackish fuscous; maxillary palpi pale, the last joint infuscated except at base, very obliquely excised apically, beneath, over more than the apical half. Pronotum black, feebly tinged with testaceous laterally, rather closely hirsute with rather short fulvous bristles, equal, nearly twice as broad as long. Tegmina covering two-thirds of the abdomen, apically well rounded, uniform testaceous, but with the lateral field feebly infuscated; wings aborted. Legs blackish above, dull flavous beneath like the under surface of the body. Cerci very regularly tapering to a fine point, about as long as the pronotum and tegmina combined. Ovipositor fully as long as the hind femora, straight, slender, the apical blades scarcely enlarged at the base, regularly tapering, scarcely more than twice as long as their basal breadth, wholly unarmed, the tip acute. Length of body, 10 mm.; of hind femora, 6.9 mm.; of ovipositor, 7 mm.

1 ♀. Orizaba, Mexico (L. Bruner).

Nemobius ensifer, sp. nov.

Head rather full, blackish castaneous, faintly striate with testaceous posteriorly, lutescent down the face; eyes not very large, rather full and prominent; antennæ testaceous, somewhat infuscated beyond the basal portions; maxillary palpi luteo-testaceous, the last joint very obliquely excised apically beneath for a little less than half its length. Pronotum fusco-castaneous, sparsely hirsute with black bristles of no great length, equal, about half as broad again as long. Tegmina three-fourths as long as the abdomen, the tip very strongly rounded, subacuminate, the veins blackish or fuscous, the ground fusco-castaneous, more or less clouded; wings very long. Legs dirty luteous marked above with fuscous. Ovipositor considerably longer than the hind femora, very slender, a little arcuate, the apical blades rather long, scarcely enlarged basally, subequal in basal half, tapering beyond, wholly unarmed, the tip blunt. Length of body, 10 mm.; of hind femora, 7.75 mm.; of ovipositor, 8.25 mm.

1 ♀. Central America, Rev. Th. Heyde (L. Bruner).

This species and the preceding can be confounded with none of the others from the unarmed blades of the ovipositor. The males are unknown.

Nemobius fasciatus.

Gryllus fasciatus DE GEER! Mém. III, 522, pl. 43, fig. 5 (1773).

Nemobius fasciatus SCUDDER! Bost. Journ. Nat. Hist. VII, 430 (1862); GLOVER, Ill. N. A. Ent. Orth. pl. 6, fig. 13 (1872); SAUSSURE, Miss. Scient. Mex. Rech. Zool. VI, 389 (1874); STÅL! Rec. Orth. III, 1 (1875); SAUSSURE, Mel. Orth. II, 242 (1877); BEUTENMULLER, Bull. Amer. Mus. Nat. Hist. VI, 266, pl. 5, fig. 9 (1894).

Acheta hospes FABRICIUS, Syst. Ent. 281 (1775).

Acheta servilis [Say, Mss.] HARRIS! Catal. Ins. Mass. 56 (1835).

Acheta (*Nemobius*) *vittata* HARRIS! Treat. 123 (1841).

Acheta vittata RATHVON, Rep. U. S. Dep. Agric. 1862, 380, pl. fig. 16 (1862).

Nemobius vittatus SCUDDER! Bost. Journ. Nat. Hist. VII, 430 (1862); GLOVER, Ill. N. A. Ent. Orth. pl. 3, figs. 9, 10 (1872); SAUSSURE, Miss. Scient. Mex. Rech. Zool. VI, 389 (1874); SCUDDER! Rep. Geol. N. H. I, 364, fig. 48 (1874).

Nemobius fasciatus vittatus BEUTENMULLER, Bull. Amer. Mus. Nat. Hist. VI, 267, pl. 5, fig. 10 (1894).

Nemobius exiguus SCUDDER! Bost. Journ. Nat. Hist. VII, 429 (1862).

? *Nemobius marginata* MURTFELDT, Ins. Life, V, 155 (1893).

This species is dimorphic: long-winged, with tegmina reaching commonly to the end of the abdomen (*fasciatus*); and apterous, with short tegmina (*vittatus*). To the former belongs *A. hospes* Fabr., and to the latter *A. servilis* Say and *N. exiguus* Scudd., this last not being *Acheta exigua* Say, which is an *Anaxipha*.

Both forms occur throughout the range of the insect, which is from Nova Scotia to North Carolina in the east, westward to the plains. I have seen specimens from as far north as northern New England, Montreal, Michigan, Minnesota and Manitoba, and as far west as South Dakota, Big Horn Mts. and Pine Cliffs, Wyo.; South Bend, West Point, Sydney and Lincoln, Neb.; Topeka, Shawnee and Barbour Cos., Kans. (all these western localities in Bruner's collection), as well as the Platte River, Nebr., and Iowa; and as far south as Decatur, Ala. (L. Bruner), and Virginia. It has been reported from other southern localities, which are probably correct, as Kentucky (Garman) and Mississippi (Ashmead); but of others I have some doubt, such as South Carolina, Louisiana and Texas (Scudder), East Florida (Walker) and Peru! (Bolivar), where probably other species are in question. In New England Mr. A. P. Morse has taken it on the top of Graylock, Mass.,

(3500'), but in the White Mountains, N. H., it occurs only in the valleys, so far as yet known.

Nemobius canus, sp. nov.

Head rather large and pretty full, beset with black bristles, gray from a mingling of dull fuscous and testaceous, above and posteriorly often separated into longitudinal stripes, the lower part of the face lutescent; eyes moderately prominent, subglobose; antennæ luteous, more or less, but nearly always slightly, infuscated; maxillary palpi luteous, the last joint infuscated, apically excised with a transverse obliquity. Pronotum subequal with slightly convex sides, generally less than half as broad again as long, sparsely beset with moderately long black bristles, luteo-testaceous, flecked more or less feebly, or suffused more or less generally with fuscous, especially mesially above and inferiorly on the sides, on the latter deepening to a fuscous stripe. Tegmina of ♂ hardly covering the abdomen, light testaceous often infumated toward base, laterally with an equal fuscous stripe next the dorsal area; of ♀ with an added fuscous longitudinal stripe on the dorsal face, outwardly, and either but little longer than half the abdomen and truncate (*brevis*), or nearly as long as the abdomen and well rounded (*amplus*); wings either wanting (*brevis*) or twice as long as the tegmina (*amplus*). Legs luteo-testaceous, the hind femora a little infuscated. Cerci fuscous, slender, scarcely longer than head and pronotum together. Ovipositor much longer than the hind femora, straight, the apical blades not enlarged at the base, regularly narrowing by the slope of the inferior margin, the tip acute, the upper edges serrate, the teeth not crowded. Length of body, ♂, 8.5 mm., ♀, 12 mm.; of hind femora, ♂, 7.5 mm., ♀, 8.6 mm.; of ovipositor, 9.5 mm.

6 ♂, 10 ♀. Dallas, Texas, (Boll); Texas, (Belfrage, Lincecum).

This species is closely allied to *N. fasciatus*, like which it appears in two forms, brachypterous and macropterous. It is possibly only a geographical race of that species, remarkable for its cinereous aspect and the striped appearance of the ♀ tegmina.

Nemobius socius.

Nemobius socius SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 37 (1877).

This species was described from a single female from Georgia, in which the tegmina are almost as long as the abdomen, and the wings, if present, wholly concealed. It is the only such specimen I have seen. All the others, of whichever sex, have the wings very long. Additional specimens come from Sandford (Frazer) and Charlotte Harbor, Fla. (Mrs. A. T. Slosson), from New Orleans, La. (Akhurst, Schaum), and from Texas (Lincecum, "under stones" Belfrage, Bell, Aaron) the last from the Gulf Coast.

Nemobius utahensis, sp. nov.

Head not very full, dark fuscous mottled more or less with tawny, sometimes forming longitudinal streaks; eyes not very prominent; antennæ testaceous or cinereous; maxillary palpi dull testaceous, the apical joint, excepting the basal third,

blackish fuscous. Pronotum equal, much less than half as broad again as long, sparsely beset with black bristles of no great length, fuscous, with a more or less distinct, sometimes very distinct, testaceous, humeral stripe. Tegmina of ♂ shorter than the abdomen, very pale testaceous, strongly infumated at base, the lateral field with a piceous stripe; of ♀ covering a little more than half of the abdomen, very broadly rounded or subtruncate apically, testaceous with the lateral piceous stripe of the ♂ and a basal dorsal piceous spot. Legs fusco-testaceous. Ovipositor scarcely as long as the hind femora, straight or very faintly arcuate, the apical blades scarcely enlarged at the base, slender and tapering regularly to a fine point, with open serration. Length of body, ♂, 7.5 mm., ♀, 8 mm.; of hind femora, ♂, 6.6 mm., ♀, 6.25 mm.; of ovipositor 6 mm.

1 ♂, 2 ♀. Spring Lake, Utah, July (U. S. Nat. Mus.); Salt Lake Valley, Utah, Aug. 1-4; an immature ♀ was also taken at same date.

This is a smaller species than *N. fasciatus*, with relatively shorter ovipositor.

Nemobius ambitiosus.

Nemobius ambitiosus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 81 (1871).

This species is only known in brachypterous form and is probably never macropterous. It has been found only in Florida, at Ft. Reed (Comstock), Charlotte Harbor (Mrs. Slosson), Sandford (Frazer), Indian River (Priddy), and Jacksonville (Ashmead). The last two localities are derived from Bruner's collection.

Nemobius neomexicanus, sp. nov.

Head rather tumid, fuscous or fusco-castaneous, paler below; eyes rather small, not very prominent; antennæ dull luteous, maxillary palpi luteous, the last joint infuscated only at extreme tip. Pronotum tapering slightly forwards, less than half as broad again as long, sparingly beset with long black bristles, testaceous or fusco-testaceous. Tegmina of both sexes as long as the abdomen, infumated except along the sides of the dorsal surface and the costal margin, which are pallid, apically strongly rounded, the lateral field in the ♀ subequal basally, tapering only on the apical third; wings twice as long. Legs luteo-testaceous, the hind femora a little infuscated. Cerci slender, hardly so long as the pronotum and tegmina together. Ovipositor about as long as head and pronotum together, straight, the apical blades not basally enlarged, tapering regularly to a point, above sharply, rather strongly, and rather distantly denticulate. Length of body, ♂, 7 mm., ♀, 7.25 mm.; of hind femora, ♂, 4.5 mm., ♀, 5 mm.; of ovipositor, 3 mm.

2 ♂, 3 ♀. Las Cruces, N. Mex.; Los Angeles, Cal.; Sierra el Taste, Lower Cal.; Comondú, Lower Cal.; all through L. Bruner.

Nemobius trinitatis, sp. nov.

Head rather tumid, fuscous; eyes hardly at all tumid; antennæ testaceous; maxillary palpi pallid, the last joint more or less infuscated apically, not more than half as long again as the penultimate joint. Pronotum scarcely tapering, about half

as broad again as long, more or less mottled with testaceous at the humeral angle. Tegmina as long as the abdomen, well rounded apically, fusco-fuliginous, more pallid along the union of the lateral and dorsal fields, the former in the ♀ tapering throughout; wings twice as long. Legs fusco testaceous or fuscous. Ovipositor about as long as the head and pronotum together, straight, not very slender, the apical blades a little enlarged basally, tapering regularly to a point, almost as long as the stem, bluntly, feebly and minutely serrulate. Length of body, ♂, 7.5 mm., ♀, 7 mm.; of hind femora, ♂, 6 mm., ♀, 5.5 mm.; of ovipositor, 2.6 mm.

1 ♂, 2 ♀. Trinidad (Uhler). This species must be nearly allied to *N. longipennis* Sauss., which I know only from description, but has a shorter and straighter ovipositor.

Nemobius aterrimus, sp. nov.

Head not very large, moderately full, black, more or less striped with castaneous above, posteriorly; eyes not very prominent; antennæ fusco-luteous; maxillary palpi fusco-luteous, the last joint infuscated except at base. Pronotum faintly tapering anteriorly, less than half as broad again as long, black, provided scantily with long, curved, black bistles. Tegmina black or blackish fuliginous, a little shorter than the abdomen, in the ♀ truncate apically; wings wanting. Legs dark fusco-testaceous. Ovipositor distinctly longer than head and pronotum together, but very much shorter than the hind femora, distinctly arcuate, the apical blades broadened basally, regularly tapering to a fine point, very minutely and closely serrulate. Length of body, ♂, 9 mm., ♀, 6.5 mm.; of hind femora, ♂, 6.25 mm., ♀, 5.5 mm.; of ovipositor 3 mm.

1 ♂, 1 ♀ Jacksonville, Fla.; Priddey, Ashmead (L. Bruner).

Nemobius cubensis.

Nemobius cubensis SAUSSURE, Miss. Scient. Mex. Rech. Zool. VI, 384 pl. 7, fig. 5 (1874); GUNDLACH, Ent. Cub. II, 367 (1891).

Nemobius volaticus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 36 (1877).

The doubtful reference by Bruner (Publ. Nebr. Acad. Sci., III, 32) to this species as coming from Nebraska is perhaps incorrect, but I do not know to what species the reference belongs.

There is some variation (at least in the United States) in the fineness of the serration of the blades of the ovipositor in this species. It is almost invariably long winged, but I have three females which are apparently apterous, though with long tegmina, one from Ogle Co., Ill. (Allen), the second from Chicago, Ill., the last from Florida. These first two localities are far north of any other known to me, excepting a single ♂ from Norway, Me. (Smith) in the Museum of Comparative Zoölogy (possibly wrongly labelled as to locality). Other specimens I have seen come from Georgia (Morrison), different places in Florida, such as Lake Worth and Charlotte Harbor (Mrs. Slosson), Sandford (Frazer), Capron (Comstock), and Indian River (Priddey-L. Bruner), Texas (Belfrage), Carrizo Springs, Tex. (Wadgyrmar-L. Bruner), Cuba

(Gundlach), San José del Cabo, Mex. (Cal. Acad. Sci., through L. Bruner) and Nicaragua (Shimek-L. Bruner). Saussure says it occurs in Cuba, Mexico and Brazil.

Nemobius mormonius, sp. nov.

Head flavo-testaceous, marked slightly with fuscous, not very full; antennae flavous, inclining to testaceous, sometimes a little infuscated; maxillary palpi flavous, the last joint only about half as long again as the penultimate, its apical third infuscated. Pronotum flavous, much marked and blotched with fuscous, especially in the central portion of the disk and at the lower margin, equal, less than half as broad again as long, clothed sparsely with moderately long black hairs. Tegmina no longer than head and pronotum together, covering only half of the abdomen, apically truncate, black, with the veins, a humeral stripe, and both inner and costal margins pallid. Legs testaceous, more or less infuscated. Ovipositor much longer than head and pronotum together, much shorter than the hind femora, very feebly arcuate, slender, the apical blades distinctly enlarged at the base, long, tapering regularly and gently to a very fine point, delicately but not very closely serrulate. Length of body, 7 mm.; of hind femora, 4.75 mm.; of ovipositor, 3.5 mm.

2 ♀, and one nymph. St. George, Utah, April (E. Palmer).

Nemobius toltecus.

Nemobius toltecus SAUSSURE, Rev. Mag. Zool. 1859, 316; ID. Miss. Scient. Mex. Rech. Zool. VI, 386 (1874).

See the remarks under the next species.

The tegmina cover the abdomen in the ♂, but only about one-half of it in the ♀, and in both wings are wanting. Originally described from Mexico (Oaxaca is specified by Saussure in 1874), I have seen specimens only from the same country—Orizaba, Jalapa and Tepic, all through Prof. L. Bruner, the last from the collections of the California Academy of Sciences.

Nemobius mexicanus.

Nemobius mexicanus WALKER, Cat. Derm. Salt. Brit. Mus. I, 57 (1869).

Nemobius sp. BRUNER! N. A. Fauna, VII, 266 (1893).

It would seem impossible to determine Walker's species with any certainty without reference to his type. His description is about equally applicable to the present species, and to *N. toltecus*, but I have regarded this as more probably Walker's species from his description of the head, which cannot apply to *N. toltecus*, while Saussure's description seems to exclude the present species. The essential distinctions between the two are given in my table.

The ♂ tegmina cover the abdomen, but those of the ♀ are shorter and wings are wanting in both. It was originally described from Oaxaca, Mex.; Bruner's specimen, as quoted above, comes from Pana-

mint Valley, Cal. I have also seen specimens from Mexico (Sumichrast), near Mescico, Méx. (Palmer), and from Jalapa, Orizaba and Menanitlan, Mex. (L. Bruner).

Nemobius carolinus.

Nemobius carolinus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 36 (1877).

Cyrtoxiphus variegatus BRUNER! Publ. Nebr. Acad. Sc. III, 32 (1893).

Nemobius affinis BEUTENMULLER! Bull. Amer. Mus. Nat. Hist. VI, 249, 267, Pl. 5, fig. 11 (1894).

No macropterous form is known. There is considerable variation, apparently independent of locality, in the fineness of the denticulation of the blades of the ovipositor.

Specimens before me come from Jackman, Me. (Harvey—A. P. Morse), Norway, Me. (Smith—Mus. Comp. Zool.), Blue Hill, Milton, Mass. Sept. (S. Henshaw), Adams, Mass. (Morse), South Kent and Canaan, Conn., (Morse), New York (Beutenmuller), Ithaca, N. Y. (Morse), Orange, N. J., (Beutenmuller), Maryland (Uhler), Vigo Co., Ind. (Blatchley), District of Columbia and Virginia (Bruner), North Carolina (Morrison, Henshaw), Lake Worth, Fla. (Mrs. Slosson), Lake Okeechobee, Fla. Palmer), New Orleans, La., (Shufeldt—U. S. Nat. Mus.), Texas (Boll), Texas "Flying to light" (Belfrage), Lincoln, West Point and South Bend, Nebr. (Bruner).

**IMPRESSIONS RECEIVED FROM A STUDY OF OUR
NORTH AMERICAN RHOPALOCERA.**

By HENRY SKINNER, M. D.

I wish to speak of specific values—a subject which has always agitated the scientific mind, and perhaps always will in the future. My excuse for writing on such a subject is the fact that I believe the proper kind of studies will enable us to approximate an absolute specific value, or at least get much nearer the truth than is now shown by a study of our catalogues and lists of species. I do not care to go into the trite subject as to what is a species, but think it only fair to give my own view, or that which I should follow in the rearrangement of our species. I look upon the species as the unit of classification, and therefore it is all important to have the basis of classification as scientifically accurate as possible. I would divide the definition of species into two heads: